THE SPATIAL DISTRIBUTION OF D-ENRICHMENTS IN RENAZZO MATRIX. Yunbin Guan[1], Scott Messenger[2] and Robert M. Walker[2]. [1]Earth and Planetary Sciences Department, [2]Physics Department; McDonnell Center for the Space Sciences, Washington University, St. Louis, MO 63130.

It has been well established that highly D-enriched materials occur in some primitive meteorites[1] and interplanetary dust particles (IDPs)[2]. However, the D-rich carriers are still incompletely characterized. As part of our ongoing efforts to investigate the anomalous components, both in primitive meteorites[3] and IDPs[2], we examined the spatial distribution of the D-enrichments in Renazzo (CR) matrix and obtained a C-rich grain with the highest dD value ever observed in CR meteorites.

Black matrix material from bulk Renazzo were crushed in quartz plates and fragments of ~10 to 50 mm in size were mounted onto sputter-cleaned Au foils for further analysis. Under an optical microscope, these small fragments could generally be distinguished as either white clear (with crystal luster) or dark opaque grains. When examined by SEM-EDX spectrometry, most of the white particles had chemical compositions similar to olivine, or a few of them to pyroxene; while the dark opaque grains had relatively higher Si contents and displayed Al peaks, probably indicating the presence of phyllosilicate minerals. Many of the black particles also contained fine FeS grains. The hydrogen isotopic composition and ion images were obtained with the Washington University modified IMS-3F Cameca ion microprobe.

The white fragments had low H^- signals and yielded normal D/H ratios where measurable. Out of the 109 dark matrix fragments analyzed, all but one grain (RN4-3-8) had dD values between 0 to +2000‰ (Fig. 1). While a few grains showed dD values less than +200‰ --- possibly resulting from incompletely separated olivine or pyroxene phases --- the majority of the dark particles had dD values between +600 to +1200‰. These values were generally higher than those (dD up to +730‰) proposed for phyllosilicates in this meteorite[4]. It is obvious that the dark opaque materials in the matrix are one of the best candidates for further characterization of D-rich carriers in Renazzo.

The exceptional grain RN4-3-8, possessed the highest dD value (+ 5200‰) ever directly measured in CR meteorites. More important, among more than 50 fragments examined with an SEM-EDX spectrometer equipped with a ultra-thin window, it was also the unique particle that displayed a C peak, suggesting that the most D-enriched components in Renazzo are associated with C-rich phases. A previous study[1] suggested that Renazzo, as well as Semarkona and Bishunpur, contained a significant amount (as high as 140 mmoles/g in Renazzo) of a soluble organic component with dD values, inferred from mass balance arguments, higher than +10000‰.

We performed ion imaging on grain RN4-3-8. No D-rich "hot spots" similar to those present in some IDPs[2,5] were found. This indicated that the distribution of the highly D-enriched components in this particle (~6 mm) is homogeneous on the scale set by the inherent spatial resolution of the ion probe (~2 mm). Ion images of many other particles that had high dD values (+1000 to +2000‰) also failed to show D-rich "hot spots".

In another way, the whole RN4-3-8 grain may be considered as a large "hot spot", compared to the average dark fragments from Renazzo matrix. Its association with C and its D-enrichment factor (relative to the average dark fragments) coincided with similar features of the "hot spots" found in IDPs[2,5], though the absolute dD values are much lower.

Our study showed that the dark fragments in Renazzo matrix are obviously D-enriched, with typical dD values between +600 to +1200‰. A exceptional C-rich grain had the highest D excess (dD=+5200‰).

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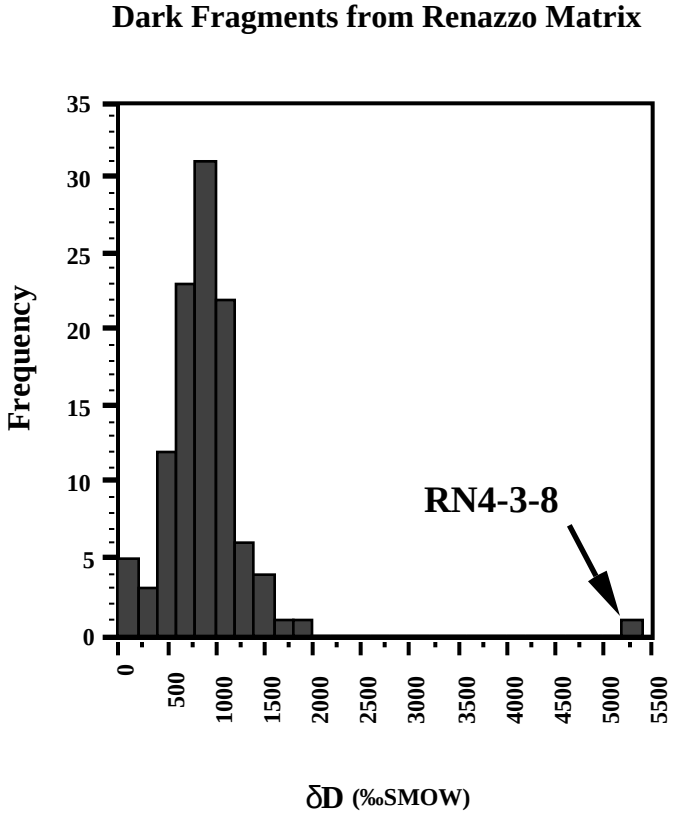

Fig. 1 Histogram of δD Values of Dark Fragments from Renazzo Matrix